



Regional Cultural and Creative Product Design Model Research Based on Hall Three-Dimensional Structure

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Abstract. Regional cultural and creative products are important media to display and spread regional culture and enhance people's cultural identity. However, due to the lack of systematic method guidance, the current design of Chinese regional cultural and creative products has several problems, resulting in most products being unable to meet the needs of consumers. Therefore, in order to optimize the design process and effect of regional cultural and creative products, it is necessary to study the general methodology of its design. This paper takes Hall three-dimensional structure theory as a methodological guidance, and introduces it into the design of regional cultural and creative products. First of all, with expanding and refining Hall three-dimensional structure, a regional cultural and creative product design model is proposed, which is included time dimension, logical dimension and knowledge dimension. Then, through a design practice of Nanjing regional cultural and creative product design, the constructed model has proven very instructive. The proposed model can help to sort out the design ideas clearly, coordinate related resources, and complete the regional cultural and creative product design smoothly.

Keywords: Cultural And Creative Product · Hall Three-Dimensional Structure · Regional Culture · Product Development · Nanjing Culture

1 Introduction

Nowadays, with the deepening trend of economic globalization, the cultures of various countries are blending, and the value of cultural soft power in national economic development and comprehensive national strength is becoming increasingly prominent. Regionality is one of the typical characteristics of Chinese culture, and the unique regional culture of each region is not only the key of differentiation and characteristic development of Chinese culture, but also the endogenous driving force of cultural self-confidence [7].

Regional cultural and creative products are the important medium for disseminating regional culture, thus their design and development have received more and more attention from the government and local departments, and have become a hot spot in design and research.

Designers combine local culture with the modern context to create cultural and creative products, and a series of regional cultural and creative products that are widely favored by consumers have emerged on the market, represented by the Cultural Creation of the Forbidden City and the Cultural Creation of Dunhuang. In theoretical research, many scholars have conducted a lot of research on the design methods and strategies of regional cultural and creative products from different angles, mainly focusing on the extraction and evaluation methods of cultural elements and the evolution of modeling [4], interactivity design [2], and the methods of design innovation [5, 9], which provide great convenience for the generation of product concepts.

However, in general, the development of regional cultural and creative products in China is still in its infancy at present, and the polarization is serious. Most regional cultural and creative products still have problems like serious homogenization, design remaining on the surface, insufficient excavation of cultural connotation, and outdated design techniques. The reason is that regional cultural and creative product design activities involve multidisciplinary knowledge and are a huge system, but the level of design and decision-making personnel is uneven, and they lack a macro grasp of the design process and related knowledge, especially the guidance of a comprehensive and systematic method system. In such a case, it is easy to lead to the blindness and uncertainty of the specific application of the design method, so the establishment of a targeted design methodology is imminent. Therefore, this paper attempts to introduce the method of system engineering, drawing on the Hall three-dimensional structural model, and constructing a system model of regional cultural and creative product design, in order to better guide the design activities.

2 Overview of Hall Three-Dimensional Structure

Hall three-dimensional structure is a systems engineering methodology put forward by American scholar Hall and his colleagues in 1969, which is formed on the basis of a large number of engineering practices [11]. It visually displays the work content and required knowledge and skills of systems engineering problems in a three-dimensional structure diagram composed of knowledge dimension, logic dimension and time dimension. The logical dimension and the time dimension are closely related and consisted of 7 steps and 7 stages respectively. The Hall three-dimensional structure prototype is shown in Fig. 1. In complex projects, the construction of Hall three-dimensional structure is conducive to the system engineers to clarify the objective and optimize the end result of the system.

3 Method

The research of this paper can be divided into two parts.

The first part: Based on Hall three-dimensional structure model and the characteristics related to regional cultural innovation and cultural and creative product design, establish a regional cultural and creative product design model and form a methodology to guide the subsequent design.

The second part: combined with specific design project—Nanjing regional cultural and creative product design, explain the process of model application.

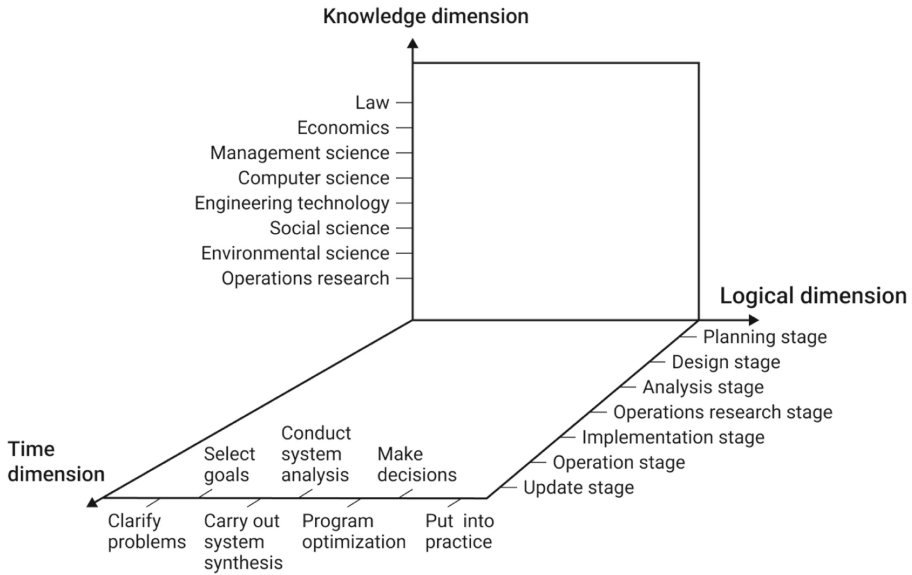


Fig. 1. Hall three-dimensional structure model.

In the specific design process, the main methods include literature research, field investigation, interview and questionnaire, expert evaluation method.

4 Results and Discussion

4.1 Analysis of Regional Cultural and Creative Product Design Model Based on Hall Three-Dimensional Structure

Regional cultural and creative product design is a branch of industrial design, but it also has its own distinctive characteristics. For example, on account of it takes regional culture as the fundamental starting point of design, excavating the most representative part of regional culture has become the top priority; in addition, more emphasis is placed on the perceptual expression of design elements, so that designed products always exude unique beauty and humanistic charm. Drawing on the Hall three-dimensional structure in the field of industrial design constructed in the existing research [10], a Hall three-dimensional structure model for regional cultural and creative product design is proposed in this research (see Fig. 2). The following takes the design and development of a cultural and creative product based on Nanjing regional culture as an example to interpret the regional cultural and creative product design model constructed.

4.2 Time Dimension

In terms of time dimension, the design of regional cultural and creative products can be divided into project planning stage, investigation and analysis stage, product concept

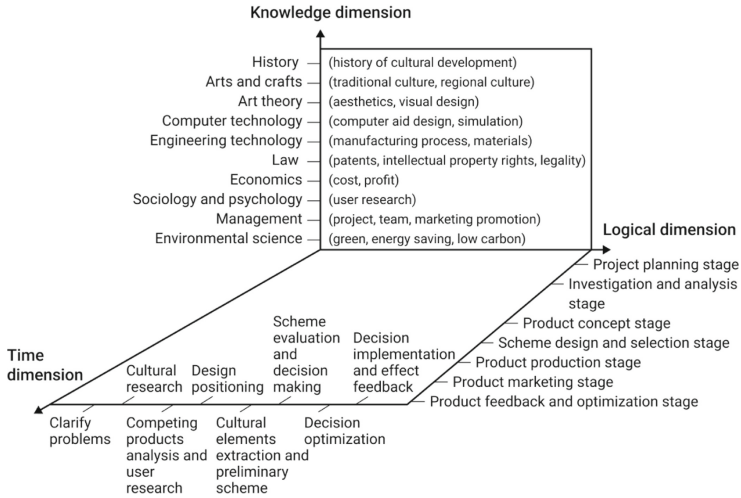


Fig. 2. Hall three-dimensional structural model of regional cultural and creative products.

stage, scheme design and selection stage, product production stage, product marketing stage, product feedback and optimization stage. The design process is linear and irreversible in time dimension [10]. Therefore, when designing regional cultural and creative products, it is necessary to have a clear grasp of the overall development process, which will be helpful to scientific management of time, reasonable control of resources, and ensure the orderly progress of the project.

It is worth noting that the project planning stage is the first and the most important stage in the design of regional cultural and creative products. Because the major target in this stage is to determine the regional culture theme of cultural and creative products, which runs through the design process from conception to the final product optimization stage. The selected culture needs to have rich cultural connotation to ensure that there are enough design elements to choose from and enough space for design to play.

4.3 Logic Dimension

The logical dimension shows the general working procedure to be followed in the specific design and development process. The logical dimension of the regional cultural and creative product design model is obtained by expanding and concretizing the logical dimension of the Hall three-dimensional structure prototype, which is mainly divided into 8 steps:

4.3.1 Clarify Problems

Design is a way to solve problems, and so is the design of regional cultural and creative products. Owing to the complexity and diversity of regional cultural and creative products design and development, it is crucial to seize the core of the regional culture on which it is based. Before the project is established, we should first clarify the problems existing

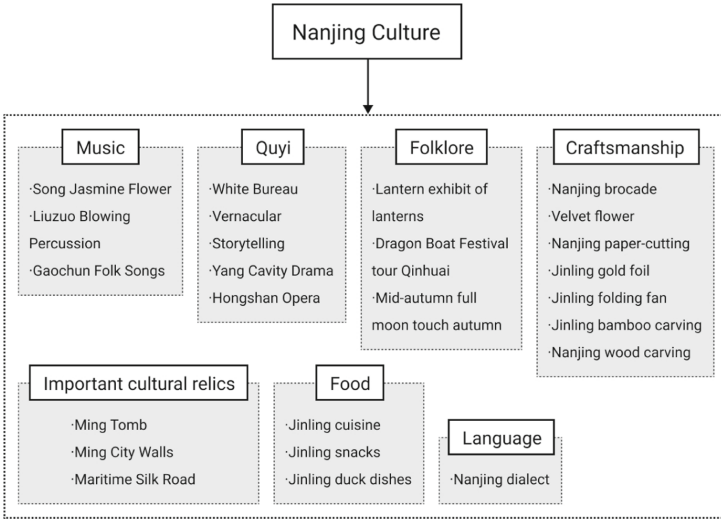


Fig. 3. Classification of Nanjing culture.

in the dissemination and development of regional culture, with the aim of determining the regional culture on which the design depends, and then further finding out the most symbolic culture in the regional culture.

As the ancient capital of the Six Dynasties, Nanjing contains rich regional culture, which has a large space for research and exploration, so this project takes Nanjing culture as the design research object. Through extensive collection of information, the Nanjing culture is listed and classified (see Fig. 3). With considered from every cultures below in the aspects of history, concrete contents, and characteristics, it is found that Nanjing Brocade has the most regional cultural characteristics of Nanjing, which is unique to Nanjing, ranking first among the three famous brocades in China (Nanjing Brocade, Chengdu Shu Brocade, Suzhou Song Brocade). It has a history of more than 1600 years, and it is a kind of fine high-grade silk fabric which weaving process is extremely complex, with various colors of silk thread, gold thread, silver thread, peacock feather thread as the material. It gotted its name because of its elegant pattern, gorgeous and solemn colorful decoration, like the beautiful clouds in the sky [3]. But at present, it is found that most of Nanjing Brocade cultural and creative products are limited to the graphic design of decorative paintings, silk scarves, tuan fans, mirrors, clothing, etc. There are defects such as expensive price, low utility and low innovation which are not conducive to the inheritance of Nanjing Brocade culture among the public in the contemporary era. Therefore, this project chooses Nanjing Brocade culture as design starting point for achieve the purpose of disseminating Nanjing regional culture, and try to design a Nanjing Brocade cultural and creative product that is suitable for the public and modern life.

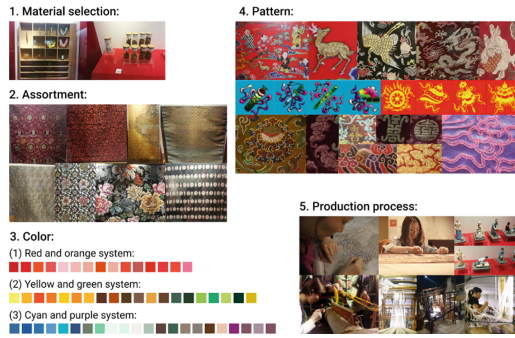


Fig. 4. Summary of cultural connotations of Nanjing Brocade.

4.3.2 Cultural Research

Regional culture stimulates creativity through its aesthetic and emotional values [1], so when studying regional culture, we should dig deep into its aesthetic and emotional contents on the basis of understanding its cultural connotations, so as to prepare for the extraction of cultural elements and the innovative design of cultural and creative products.

Cultural research is to conduct an overall understanding and study of the selected typical regional culture. Through the field investigation of Nanjing Brocade Museum, combined with the existing literature and library materials, the Nanjing Brocade culture is deeply comprehended, and its cultural connotations are summarized from five aspects: material selection, assortment, color, pattern, and production process (see Fig. 4). It can be seen that Nanjing Brocade culture has strong aesthetic value in the use of color, and the pattern of Nanjing Brocade fabric contains the traditional Chinese auspicious culture, which can evoke people's emotional memory. In addition, up to now, the Zhuanghua silk fabric of the Nanjing Brocade can only be hand-woven with the Dahualou jacquard loom, which is an important identifying feature that distinguishes it from the Shu Brocade and the Song Brocade. Thus, the hand-weaving technology of the Nanjing Brocade has also been successfully selected into China's "First National Intangible Cultural Heritage List" and the "Representative List of the Intangible Cultural Heritage of Humanity" in the early 21st century [6].

To sum up, it can be obtained that the color application, pattern modeling characteristics and auspicious meaning, Zhuanghua weaving technology are the most distinctive and valuable contents of Nanjing Brocade culture. These can be applied in subsequent design process.

4.3.3 Competing Products Analysis and User Research

Before the formal start of design output, it is significant to consider the user needs and commercial goals to determine the material carrier of cultural and creative products. Competitive product analysis and user research are not only the work done for this, but also the sound basis for design positioning. The main task in this stage is to conduct

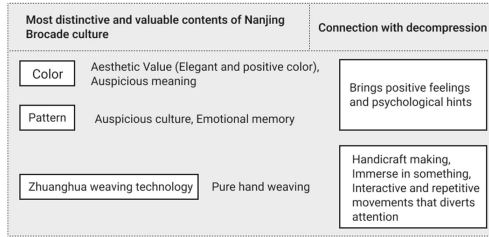


Fig. 5. The connection between Nanjing Brocade culture and decompression.

preliminary research through data collection method, interview method, questionnaire survey method, and then refine user requirements and design opportunity points.

(1) Product carrier determination

In order to better integrate Nanjing Brocade culture with modern life, it is necessary to explore the coherence point between culture and the pain points of public in current society [12].

Through the existing research results on the psychotherapeutic effect of traditional Chinese culture [13] and previous analysis of Nanjing Brocade culture, it is found that the handicraft nature of Nanjing Brocade itself and its unique color and implication are related to decompression, and they are also the most unique and valuable part (see Fig. 5). Meanwhile, considering the social situation of mental health problems caused by modern fast-paced life, we decided to integrate Nanjing Brocade culture into the design of stress-reducing product. In this project, by analyzing the psychological counseling report [8] and relevant data, it is concluded that young people aged 22 to 35 bear the greatest pressure from career and learning. In view of the fact that these group of people are also curious about new things and Chinese traditional culture, they are chosen as target user group of design.

(2) Competing products analysis

Competing products analysis is to find out the similar products on the market, to ensure that there is a sufficiently large competitive advantage when the product come into market. Through analysis, it is concluded that there are certain types of adult stress-reducing products on the market (see Fig. 6), and the decompression methods used can be summarized as immersive in something (painting, DIY etc.), intractive and repetitive movements that diverts attention (such as pressing, flipping, squeezing, or looking at rotating or flowing objects), emotional catharsis (shouting, slapping, bending etc.), puzzle and outdoor activities, listening to music. These can provide reference for the determination of the stress reduction method of regional cultural and creative products. But almost no culture is integrated into the these products, indicating that the initial positioning has a certain degree of innovation.

(3) User Research

After the analysis of competitors is completed, the user needs are investigated by distributing questionnaires online and conducting offline interviews. And the results obtained need to be analyzed qualitatively and quantitatively. According to the analysis of the user survey results (see Fig. 7), the users' demands for cultural



Fig. 6. Competing products collection.

and creative stress-reducing product are collected, including good stress reduction effect, can divert attention rapidly, fun but not complicated, beautiful appearance, portable, practical, profound cultural connotation, and so on, of which utility, fun, and cultural connotation are the most valuable to users. As for decompression mode preference, music decompression and immersive interactive decompression are the most accepted and recognized.

In actual operation, competing products analysis and user research often do not have an absolute order of time, and can be carried out simultaneously or alternately.

4.3.4 Design Positioning

The design orientation clarifies the product conception from various aspects, which is the overall comprehension of regional cultural creation product design. Based on the above preliminary analysis, 5W2H method is used to make a more specific design positioning (see Table 1).

4.3.5 Cultural Elements Extraction and Preliminary Scheme

This stage is the stage of giving full thought to the creativity of product design, which is a process of substantiating and visualizing the design direction. In this stage, in order to grasp the most essential cultural connotation while consistent with the design direction, the representative elements of regional culture are extracted by design thinking and expression means such as hand sketching, in the meantime the contents of design positioning is also considered, to put forward the preliminary design schemes of regional cultural and creative product.

In this project, cultural elements extraction mainly includes two aspects: vision and interactive mode. In terms of vision, for the sake of retain the typical visual characteristics and deep implied meaning of Nanjing Brocade cultural elements to the greatest extent, the typical patterns on Nanjing Brocade fabric are selected, by simplifying and modernizing it, the important symbols and colors are extracted and involved in product scheme. In the aspect of interactive way, the manual weaving mode of Nanjing Brocade is simplified and integrated into the operation mode of the product. In addition, combined with the stress relief demands of users, the corresponding decompression methods are also used in the design. Besides, the color and shape should be concise and soft to meet modern aesthetic and emotional needs.

By means of sketching (see Fig. 8) and computer 3D modeling and rendering (see Fig. 9), a variety of possibilities of product design are emerged and expressed. After

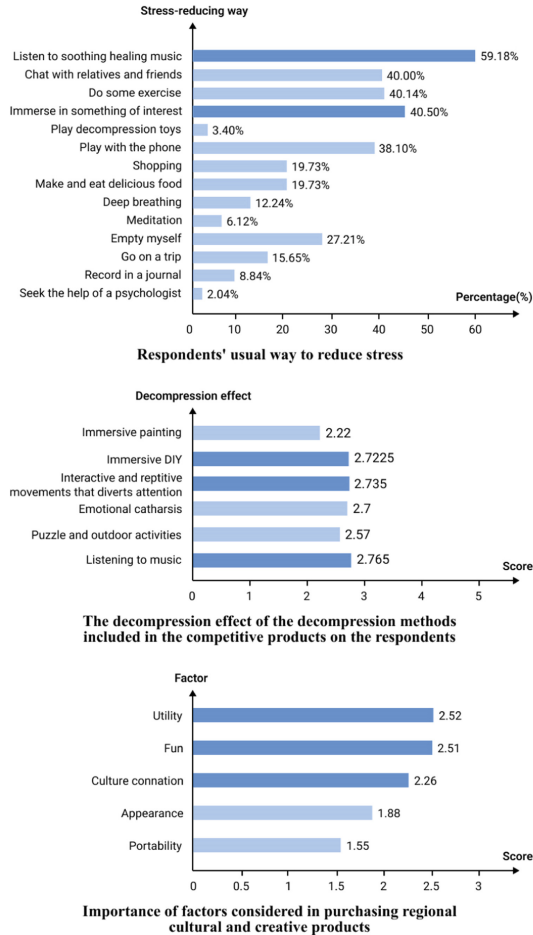


Fig. 7. User survey results.

that, through the prototype model making (see Fig. 10), the feasibility of the design schemes is preliminarily verified. And then multiple alternative schemes are obtained, which will be further screened and decided during the scheme evaluation and decision making stage.

4.3.6 Scheme Evaluation and Decision Making

In this stage, alternative schemes are evaluated and the final design is finalized. According to expert opinions and literature research, the evaluation criteria for the stress-relieving product based on Nanjing Brocade culture (see Table 2) are summarized. In accordance with the evaluation criteria, the aforementioned alternative schemes are comprehensively evaluated in the way of scoring on the basis of the importance weights of each index, and the best design solution is selected, that is, the final design decision is made.

Table 1. Design Positioning.

Name	Concrete content
What	Stress-reducing product based on Nanjing Brocade culture
Who	Adults aged 22 to 35 who are interested in Chinese traditional culture and have great pressure to study or work
Why	The decompression needs of adults have something in common with the cultural connotation of Nanjing Brocade
Where	Family environment
When	Free time after work
How	Combine the cultural connotations (give priority to color, pattern, Zhuanghua weaving technology) of Nanjing Brocade with decompression. In the selection of decompression methods, give priority to music decompression and immersive interactive decompression; At the same time, make sure it is interesting for users.
How much	The price is moderate and in line with the consumption level of most consumers



Fig. 8. Sketches.

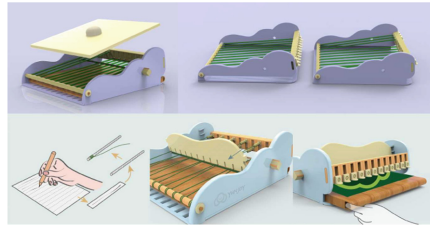


Fig. 9. 3D renderings.

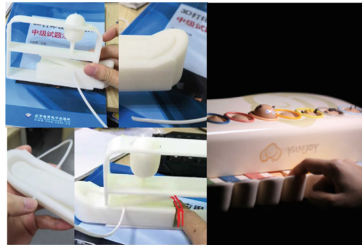


Fig. 10. Prototype model making.

Table 2. System evaluation criteria.

Evaluation index	Concrete content	Importance
1. Cultural nature	Embodiment degree of regional culture; proper selection and refinement of regional cultural elements	3
2. Utility	Actual decompression effect	3
3. Comfort	Ergonomics (in line with man-machine dimensions)	3
4. Artistics	The appearance meets the aesthetic needs of users and the contemporary design concept; The appearance can be integrated into the home environment	2
5. Affective	Fun and entertaining; can arouse the emotional resonance of users	2
6. Technical implementation difficulty	Meet the requirements of production and processing; the processing cost is reasonable and moderate	1

The final design scheme is shown in Fig. 11. The scheme well combines the patterns, colors, manual weaving method of Nanjing Brocade, music, immersive decompression operation, and realizing the integration of Nanjing regional culture and decompression demand, modern aesthetic and other aspects (See Fig. 11 for the specific scheme details).



Fig. 11. Final design scheme.

4.3.7 Decision Optimization

Decision optimization is carried out before the product is officially put into large-scale production. In this stage, it is necessary to conduct small-scale production of the final design and obtain market feedback on a small scale. For example, the product design and development team can organize some users to try out the developed product through

small-scale product testing activities, or obtain market feedback through crowdfunding, thus to understand the acceptance and recognition degree of the product by consumers and the actual market. Suggestions for improvement can also be obtained by these methods. And if necessary, the product can be fine-tuned and optimized accordingly. Then decide whether the product can be mass produced, whether to market, when to market, sales channels, marketing promotion methods and other issues.

4.3.8 Decision Implementation and Effect Feedback

Decision implementation refers to handing over the finalized product design to the manufacturer for official production and marketing, while collecting market sales and user reactions to obtain all-round feedback on the design effect. These feedback can be used as the basis for further iterative improvement of product, and can also provide important reference for the design and development of next-generation products or regional cultural and creative products of the same series or theme.

From the logical dimension analysis of the regional cultural and creative product design model, it can be found that the logical dimension presents the progression of the depth of design thinking and the improvement of the logical structure in the promotion of each link, and there is an obvious echo between the time dimension. Nonetheless, it does not have a fixed order in time, for instance the extraction of cultural elements can also be carried out simultaneously at the stage of cultural research. Its outstanding feature is that problems in any link can be torn down and restarted, reflecting the gradual nature of regional cultural and creative product design activities.

4.4 Knowledge Dimension

The knowledge dimension indicates the skills and theoretical knowledge required to engage in the design of regional cultural and creative product. In general, it mainly includes: (1) the knowledge of history and arts and crafts required in cultural research; (2) sociological and psychological knowledge required in user research; (3) the computer technology, engineering technology and artistic literacy required in the process of product conception and design determination; (4) the knowledge of law, economics and environmental science required for decision optimization and implementation; (5) management knowledge needed in design project operation and team management. There is a nonlinear coupling relationship between the features [10].

The diversity of knowledge presented by the knowledge dimension not only shows that designers need to have overall and systematic thinking and knowledge, but also shows to a certain extent that the design of regional cultural and creative products requires multidisciplinary cross-cutting forces. It needs to rely on design and management teams and reasonable division of labor to ensure the high efficiency and accuracy of design activities. If possible, you can also try to cooperate with local designers, well-known merchants, and even folk arts and crafts artists, historians and other relevant personnel to fully integrate the resources of all parties and improve the level and depth of design.

5 Conclusions

Regional cultural and creative products are deeply rooted in regional culture, have received widespread attention in recent years, and have been developed in China's deep cultural soil. But their design level still needs to be improved, and it is urgent to change design methods, design processes, design knowledge systems and other aspects. The design of regional cultural and creative products is a systematic engineering problem that needs to be solved by using system engineering methods. In this paper, combined with the development requirements of regional cultural and creative products in contemporary times, using the systematic engineering methodology based on Hall three-dimensional structure, the regional cultural and creative product design model is constructed, and the model is analyzed and sorted out in the design methodology level in combination with the design project instance. On a whole, the research in this paper provides a systematic theoretical reference for relevant personnel who intend to engage in regional cultural and creative product design.

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